

TO THE HONORABLE ASSISTANT COMMISSIONER
OF
PATENTS AND TRADEMARKS

EXCAVATOR AND BACKHOE ATTACHMENT ADAPTER

Inventor: Joseph E. Poquette
Attorney for Inventor: Kevin Ellicott, Esq.
Address:
1 Scale Ave, Suite 112
Rutland, VT 05701
Reg. No.: 38,867

SPECIFICATIONS

A

Title

[0001] Your inventor, Joseph E. Poquette, hereby respectfully submits this, his non-provisional application for Letters Patent as respects his invention entitled "Excavator And Backhoe Attachment Adapter".

B

Cross Reference to Other Applications

[0002] This is the first submission of an application for this article of manufacture. There are no other applications, provisional or non provisional.

C

Federally Sponsored Research and Development

[0003] There are no federally sponsored or funded research or development projects or undertakings in any way associated with the instant invention.

D

Background of the Invention

1. Field of the Invention:

[0004] The instant invention relates to that field of devices consisting of articles of manufacture known as attachment adapters. Specifically, the instant invention is an implement attachment adapter for use with excavators, backhoes and similar heavy machinery.

2. Background Information:

[0005] The prior art known to the Inventors discloses that various forms of buckets and shovels for attachment to a backhoe, excavator or other similar heavy machinery (the sort usually having an "arm") are well known throughout the arts.

[0006] These attachments are generally built for specific types of heavy machinery from specific manufacturers, and their attachment means for being connected to the particular machine will vary somewhat as a result.

[0007] However, the basic concepts apply irrespective of the particular attachment configuration chosen, and throughout the industry which manufactures heavy machinery such as backhoes and excavators.

[0008] In general, the backhoe or excavator will be a self-propelled heavy machine, moving on wheels and or tracks. The heavy machine of the sort contemplated herein will generally include a multi-piece, jointed and flexible arm capable of being moved using hydraulic fluid filled actuators, gears, chains and etc. Normally, the heavy machine will be equipped at the terminating end of this arm with a bucket, scoop or shovel. It is this bucket, scoop or shovel which is actually brought into contact with the surface or object to be worked upon, frequently being used to dig holes, ditches and such, and then remove the material from the hole, ditch and etc., and deposit it elsewhere. This normally requires that the arm be flexed and swung outwardly, away from the operator of the machine, brought upward somewhat, and then swung downwardly to bring the bucket into contact with the surface upon which the heavy machine is operating. The operator of the

heavy machine then flexes the arm again, pivoting the bucket at the end of the arm towards the operator and thereby digging the bucket into the work surface. The motion continues, with the bucket pivoting towards the operator and upward again, so that the bucket becomes filled with the surface material it has just dug into.

[0009] On other occasions, the operator may wish to push material into a hole or ditch, using the bucket more as a sweeping device than as a digging device, in which case nearly the opposite set of motions is undertaken.

[0010] Unfortunately, to date no one has seen fit to take advantage of this "pushing" capability of the backhoe and excavator and constructed any of the various implements which would be made useful through such pushing capability.

[0011] This is due, in large measure, to the fact that to date no adequate implement attachment adapters which would cooperate between the arm of the heavy machinery and such implements has been fabricated or described.

[0012] The inventor has created such an implement attachment adapter as well as fabricating one example of implement that will be disclosed herein.

E

Summary of the Invention

[0013] The instant invention is an adapter for use with heavy machinery such as excavators and backhoes. For the first time, it is possible connect a wide range of implements to a backhoe or excavator and perform myriad tasks which before required additional machine to be brought to a job site, or the reassignment of manpower from one job to another. And although the instant invention is

generally referred to as being useful with a backhoe or excavator, it is entirely possible that it may be used with nearly any heavy machine having an arm of the sort found on excavators and backhoes without departing from the scope of the claims.

[0014] A first object of the instant invention, therefore, is to provide for an adapter capable of being attached to the arm of an excavator, backhoe or similar heavy machinery which may in turn be attached to an implement for doing a particular job.

[0015] This objective is fabricating an adapter body having a means for attaching to heavy machinery and means for attaching to an implement.

[0016] A second objective of the invention is to provide at least one example of an implement which may be quickly and easily attached to the adapter and which will allow the heavy machinery to be used to move human beings from the ground to an elevated position.

[0017] This objective is accomplished by fabricating a "man basket" having a means for attaching to the implement adapter, though other implements including, but not limited to a fork lift, a three point hitch cable plow, and a limb shear may be easily substituted. There are so many potential implements which could conceivably be made more useful through attachment to a backhoe or excavator that it would be impossible to describe them all, hence only the attachment of a man basket is referenced in the specification or claims.

F

A Description of the Drawings

- [0018] FIG. 1 is a perspective view of the preferred embodiment of the instant invention.
- [0019] FIG. 2 is a perspective view of the second embodiment of the instant invention.
- [0020] FIG. 3 is a close-up perspective view of a portion of the attachment means for use with a tilting mechanism.
- [0021] FIG. 4 is a top view of the portion of the attachment means for use with a tilting mechanism.
- [0022] FIG. 5 is an elevational perspective view of a portion of the arm attachment means of the second embodiment.
- [0023] FIG. 6 is a side elevational view of the portion of the arm attachment means of the second embodiment.
- [0024] FIG. 7 is a close-up perspective view of an arm mount sleeve of the second embodiment.
- [0025] FIG. 8 is a close up perspective view of the implement attachment means.
is a close up perspective view of a hook portion of a tilting mechanism used normally to attach a bucket to an arm on a heavy machine.
- [0026] FIG. 9 is an overhead perspective view of a man basket having an adapter attachment means.
- [0027] FIG. 10 is a partial view of the first embodiment of the instant invention with the hook portion of a backhoe arm engaging the corresponding attachment point of the instant invention.
- [0028] FIG. 11 is perspective view showing one way of engaging the a hook with the first

embodiment of the instant invention.

G

A Description of the Preferred Embodiment

[0029] As per FIGs. 1 and 2, an implement adapter includes a body (1), the body in the preferred embodiment being a generally elongated, platform-like body. In the preferred embodiment, the body is constructed from a first hollow beam (2) and a parallel and horizontally co-planar second hollow beam (3). In the preferred embodiment, each hollow beam is box-like in cross sectional shape, having a top wall (4), an inner wall (5) adjacent to the top wall, an outer wall (6) adjacent to the top wall and opposite and spaced apart from the inner wall, and a bottom wall (7) adjacent to the outer wall, and inner wall and spaced apart from the top wall (4). The hollow beams each have a first end (13) and an opposite second end (14). Hollow box-like bodies are well known throughout most art fields, being generally accepted as having spaced apart walls defining the hollow interior (in much the same manner as does a 6 sided, hollow, three dimensional box). Though the preferred embodiment contemplates a generally rectangular "box-like" body, with open ends, the precise geometric form of the hollow body is unimportant. It could just as easily be cylindrical or tube-like in form, in which case there would be one continuous wall.

[0030] As with any three-dimensional body, first hollow beam and the second hollow beam each have length (8), width (9) and height (10). Furthermore, the walls of the hollow beams naturally have beam wall thickness (11). The precise length, width, height and thickness of the hollow beams is largely dependent upon

attachment configuration and dimensions of the arm to which the implement adapter is to be attached, and the load, mass or stress to which the adapter will be exposed when the implement is attached to it, and in use. That is, where the implement is more massive, it will require, for example, that the walls of the hollow beams be either thicker or fabricated from a more resilient material or a combination of both. Also, as the beams are made longer to move an implement further away from the arm, the tendency of the beams to deflect or bend should be overcome by using thicker walls, more resilient material, or both. In the preferred embodiment, the hollow beams are fabricated using four inch square tubing with a wall thickness of approximately $\frac{3}{8}$ of one inch. The first hollow beam length in the preferred embodiment is 36 inches, though this is given merely as an example, and is in no way limiting or absolute.

[0031]

Those familiar with the art of fashioning adapters are well aware of the need to fully understand from an engineering perspective the relative strengths and pliability of materials and the dimensions those materials must be fashioned into in order to withstand the forces which the adapter will experience when in use. In this case, the adapter is being used with a piece of heavy machinery (e.g. an excavator) and allowing the attachment of an implement (e.g. a man box) which may be loaded with upwards of 500 or 600 pounds. Obviously the hollow beams will need to be constructed of a strong, rigid material such as steel and will need to have walls of sufficient thickness to prevent them from bending or breaking while the arm lifts the man box. In the preferred embodiment, the hollow beam wall thickness (11) is approximately three eighths of one inch, the hollow beam length

(8) is approximately 36 inches and the hollow beam height (10) and width (9) are equal to one another at approximately 4 inches. The preferred material from which the beams will be fabricated is steel.

[0032]

As per FIGs. 1 and 2, the implement adapter body (1) further includes a first hollow cross beam (12). In the preferred embodiment, the first hollow cross beam is structurally similar to the first hollow beam (2) and the second hollow beam (3) being generally box-like in construction with a top wall, bottom wall, inner wall and outer wall. The first hollow cross beam also has a first end (15) and spaced apart, opposite, second end (16) and first hollow beam length (45). The first hollow cross beam first end (15) is firmly connected to the second hollow beam (3) inner wall, proximate to the second hollow beam first end (13) and the first hollow cross beam second end (16) is firmly connected to the first hollow beam (2) inner wall, proximate to the first hollow beam first end (13). The first hollow cross beam is therefore essentially perpendicular relative to the first hollow beam and the second hollow beam and horizontally co-planar with both the first hollow beam and the second hollow beam and spans between the first and second hollow beams. In effect, the first hollow beam, second hollow beam and first hollow cross beam once firmly connected as noted above, take the form of an essentially squared off "U".

[0033]

As per FIGs. 1 and 2, the implement adapter further includes a second hollow cross beam (17). In the preferred embodiment, the second hollow cross beam is essentially a cylinder having a continuous outer wall, a first end (18) and an opposite and spaced apart second end (19). The second hollow cross beam has

length (20) preferably equal to the first cross beam length. The second hollow cross beam is firmly attached at its second end (19) to the first hollow beam second end (14), and the second hollow beam first end (18) is attached to the second hollow cross beam second end (14). The second hollow cross beam is parallel to the first hollow cross beam, perpendicular to the first and second hollow beams, and horizontally coplanar with the first hollow beam, second hollow beam and first cross beam.

[0034] The main body portion of the implement adapter now described, it is useful to describe the particular arm attachment means, as per FIGs. 1 and 3. Because the particular arm attachment means is dependant upon the particular arm to which the implement adapter will be attached, it is useful to describe with some particularity how this is accomplished with a single, particular article of manufacture, namely a bucket tilting mechanism manufactured by the Wain-Roy Corporation, the bucket tilting mechanism further being attached to the arm of a John Deere model 490-D.

[0035] As per FIGs. 1 and 3, the arm attachment means includes a mounting plate (21) and a bushing (22). The mounting plate has a first end (23) and an opposite second end (24), and preferably has sufficient length to span the distance from the first hollow beam outer side to the second hollow beam outer side. The mounting plate is attached at its first end to the first hollow beam top wall and at its second end to the second hollow beam top wall. The mounting plate has mounting plate thickness (25), which in the preferred embodiment is $\frac{3}{4}$ of one inch. However, this thickness is once again dependent upon the material from which the plate is to be

manufactured and the stress the plate will be subjected to when in use, and may be varied accordingly. As was noted, the mounting plate should be long enough to span the first and second hollow beams, and furthermore, the plate is oriented such that its length is parallel to the second cross beam length. The mounting plate, however, is obviously located in a different horizontal plane than the second cross beam given its stated attachment to the top wall of the first hollow beam as opposed to the stated attachment of the second hollow cross beam to the inner wall of the first hollow beam.

[0036] As per FIGs. 1, 3 and 4, the bushing (22) used in the arm attachment means may be more particularly described as essentially similar to a doughnut (torus), firmly affixed within a bushing mount (30) through a bushing mount hole (33) passing completely through the bushing mount. And while it may be described as being in the form of a torus, it could obviously just as easily be a short cylinder instead. The bushing (22) has a center opening (29), the center opening having a bore and bore wall (32), the bore having interior diameter (26). The bushing further has exterior diameter (27), a bushing axis (28) extending axially through the center opening (29) and bushing thickness (35).

[0037] The bushing (22) is firmly attached to the arm attachment means mounting plate (21) by the bushing mount (30). The bushing mount may be described as essentially being a plate having a hole passing therethrough, the plate being roughly arch shaped. The bushing mount obviously has thickness (34), the bushing mount thickness preferably being less than the bushing thickness (35). The bushing mount hole has a diameter (31) nearly equal to, but slightly larger than, the

bushing exterior diameter (27) such that the bushing may be firmly and securely inserted through and into the bushing mount hole, and be firmly attached to the bushing mount (30). And while the bushing and the bushing mount are herein described as being separate components which are firmly attached to one another, it is entirely possible that the two components be manufactured as a single, one piece unit without departing from the scope of the claims.

[0038] The bushing mount (30) is firmly affixed along a bushing mount bottom surface (36) to the arm attachment means mounting plate (21). As has been noted above, the mounting plate spans across the first hollow beam and second hollow beam. The bushing mount, in turn, is affixed to the mounting plate such that bushing axis (28) is located preferably midway between the first hollow beam (3) and the second hollow beam (4). The bushing, once so affixed, should be mounted so that the bushing axis (28) is parallel to the second hollow beam length (8) and perpendicular in relation to the second hollow cross beam length (20). Obviously, the bushing axis is not in the same horizontal plane as either the second hollow beam or the mounting plate (21).

[0039] It has been found advantageous to have the arm attachment means mounting plate (21) include a mounting plate cut out (33). This is due primarily to the requirements of the particular arrangement of the arm to which the device is to be attached, and provides clearance for a lock pin to be inserted, and all the arm to move freely during operation of the heavy machinery without binding against the mounting plate (21). When such a mounting plate cut out (33) is included, the bushing mount (30) should be located on the mounting plate (21) distally from the

mounting plate cut out and more proximate to the first hollow cross beam (12). Clearly this is so that the bushing mount bottom surface (36) is completely in contact with the mounting plate and does not extend over the mounting plate cut out area (33).

[0040] It has also been found useful to include with the device a brace (37) having a span approximately equal to the span of the arm attachment means mounting plate (21). This brace is simply a flattened plate, preferably fabricated from the same material as the mounting plate (21), and serving the purpose of further strengthening the device to prevent deformation and deflection and add rigidity.

[0041] Finally, As per FIGs. 1 and 4, the preferred embodiment of the instant invention includes an implement attachment means (38). The preferred embodiment of the implement attachment means is a plate fabricated from a substantially strong and rigid material such as the same material from which the first hollow beam is fabricated. The implement attachment means has length (39), height (40), thickness (41) and a top edge (47) opposite and spaced apart from a bottom edge (48). The preferred embodiment of the implement attachment means further includes mounting holes (42), passing completely through the implement attachment means. The mounting holes each have diameter (43) and serve as the locations through which connectors, such as bolts may be passed and an implement secured to the implement attachment means (38). The number of such mounting holes, and their precise placement on the implement attachment means is unimportant so long as there are a sufficient number such that the implement will be stable, firmly and securely attached to the implement attachment means. In the

preferred embodiment, the inventor includes six such holes in the implement attachment means, each having a diameter of approximately .80 inch. This diameter may easily be varied to accommodate differently sized connectors. It has been found useful for the holes to be arranged on the plate such that there is a first row of holes and a second row of holes, the first row and the second row each having three holes, the two rows, the first row and the second row being spaced apart from one another at a row space distance of approximately 6 inches. It should be obvious that the row space distance should be sufficiently large so that a connector passed through the implement attachment means (38) will not bind upon or come into direct contact with the first hollow cross beam (12).

[0042] The implement attachment means (38) may also include a bottom lip (44) extending the full length of the implement attachment means, along the bottom edge (48). Such a lip is particularly useful to provide support while attaching an implement and assist in aligning the mounting holes.

[0043] As per FIGs. 1 and 4, in the preferred embodiment the implement attachment means is firmly attached to the first end (13) of the first hollow beam (2) and the second hollow beam (3), as well as along the entire length (45) of the first hollow cross beam (12). Such attachment may easily be accomplished in the same fashion as the first hollow cross beam and the second hollow cross beam are attached to the first hollow beam and second hollow beam, namely by welding or the like. The implement attachment means (38) is preferably attached to the first hollow beam, second hollow beam and first hollow cross beam such that first hollow beam top wall (4), where it meets the implement attachment means, is the

same distance from the implement attachment means top edge (47) as the first hollow beam bottom wall (7), where it meets the implement attachment means, is from the implement attachment means bottom edge (48). Or, to put it slightly differently, in the preferred embodiment the implement attachment means is essentially centered relative to the first hollow beam and second hollow beam first end and the first hollow cross beam.

[0044] The attachment of an implement to the instant invention may now be fully understood. As per FIGs. 1, 4 and 5, a manbasket (49), which is in essence a hollow box having open sides, an open top, and a solid bottom upon which occupants may stand includes an adapter attachment means (50) being sized and shaped to permit attachment to the implement attachment means (38) so that the implement attachment means and the implement plate may be mated to one another and connected. Therefore, where the implement attachment means is a plate, as in the preferred embodiment, including six holes, the adapter attachment means should also be a plate having six corresponding holes. However, one could easily substitute a plate having six corresponding threaded bolts attached directly thereto, and simply match the threaded bolts to the holes passing through the implement attachment means in the preferred embodiment, engaging the threaded bolts through the holes and then using threaded nuts on each threaded bolt to secure the manbasket to the instant invention.

[0045] It will now be immediately clear to those familiar with the art that while the inventor has chosen to incorporate a flat metal plate into the implement attachment means and a flat metal plate into the adapter attachment means, the various way

such attachments may be securely but removably obtained is enormous. Obviously this particular description is one among many, and without limiting the claims or disclosure one could list equivalents such as individual mounting plates at the end of each hollow beam mating to a pair of adapter attachment plates, and one could easily substitute, for example bolts having transaxial holes passing therethrough for insertion of a cotter pin (so-called "lock pins"). So long as the implement may be securely but removably connected to the instant invention, the precise manner for so doing is not critical.

[0046] Finally, the implement adapter is removably attached to the particular heavy machine (e.g. excavator) with which it is to be used. And as was noted above, the preferred embodiment of the implement adapter described above has been constructed to be used with a Wain-Roy bucket tilter, Model 033-033. As noted above, the most distal end of the arm, which is normally attached to a bucket, but for purposes of use with the instant invention has been detached from said bucket, is attached instead to the Wain-Roy tilting mechanism, which is well known in the art. The Wain-Roy tilting mechanism is then normally attached directly to the bucket. However, when using the instant invention, it is instead brought into contact with the implement adapter such that the bucket attachment portion of the Wain-Roy tilting mechanism may be engaged with the second hollow cross beam (17), wrapping around the second hollow cross beam in the same manner it would the analogous portion of the bucket. The portion of the Wain-Roy tilting mechanism utilizing a pin with an exterior diameter slightly smaller than the bushing center opening bore interior diameter (26) is then slid into

the bushing center opening, engaging the bushing and being secured in the same fashion as it would be secured to the bucket. The attachment of the arm to the Wain-Roy type tilting mechanism and the attachment of the Wain-Roy type tilting mechanism to the implement adapter is therefore not new, rather, it relies upon the same analogous attachments as one would make when attaching a bucket to the Wain-Roy type tilting mechanism. This attachment is based largely upon the requirements of the arm, the bucket, and the Wain-Roy type tilting mechanism, and those familiar with the art will immediately recognize that such attachments may be made in myriad ways without departing from the scope or the spirit of the claimed invention. Obviously if a manufacturer chooses to modify the structure for attaching a bucket to a bucket tilting mechanism, the instant invention may be modified in a similar fashion to make the implement adapter function usefully with that particular heavy machine, the bucket, and the bucket tilting mechanism. So long as the instant invention may be attached to the heavy machine, with the bucket tilting mechanism located between the arm and the instant invention, and the instant invention then attached to an implement such as the man basket (49), described above, the invention will function as intended by the inventor.

[0047]

And while it has been made abundantly clear that the preferred embodiment has been described with such great particularity despite the fact that it may, and almost certainly must, be modified slightly in order to function properly with various pieces of heavy machinery such as back hoes and excavators constructed by various manufacturers, the inventor now provides a second such example of a modified implement adapter in the form of a second embodiment. It will be clear

and obvious to those skilled in the art that the principal distinctions between the two embodiments are the result of the attachment requirements between the arm and the bucket, without the inclusion of a bucket tilting mechanism such as the Wain-Roy type tilting mechanism utilized above. That is, in the second embodiment, the instant invention is attached directly to the heavy machinery arm and the implement.

[0048] As per FIG. 2, an implement adapter comprises, in the second embodiment, a body (1) having the first hollow beam (2) and the parallel and horizontally coplanar second hollow beam (3). In the second embodiment, each hollow beam is box-like in cross sectional shape, having the top wall (4), inner wall (5) adjacent to the top wall, the outer wall (6) adjacent to the top wall and opposite and spaced apart from the inner wall, and the bottom wall (7) adjacent to the outer wall, and inner wall and spaced apart from the top wall (4). The hollow beams each have the first end (13) and the opposite second end (14). Though the second embodiment, like the preferred embodiment, contemplates a generally rectangular "box-like" body, with open ends, the precise geometric form of the hollow body is unimportant. Like the preferred embodiment, it could just as easily be cylindrical or tube-like in form, in which case there would be one continuous wall.

[0049] As with preferred embodiment, first hollow beam and the second hollow beam each have length (8), width (9) and height (10). Furthermore, the walls of the hollow beams naturally have beam wall thickness (11). The precise length, width, height and thickness of the hollow beams is largely dependent upon attachment configuration and dimensions of the arm to which the implement

adapter is to be attached, and the load, mass or stress to which the adapter will be exposed when the implement is attached to it, and in use.

[0050] In the second embodiment, the hollow beam wall thickness (11) is approximately .38 inch, the hollow beam length (8) is approximately 36 inches and the hollow beam height (10) and width (9) are equal to one another at approximately 4 inches. The preferred material from which the beams will be fabricated is steel, though the material is unimportant so long as it is strong and rigid enough to support the weight of the implement and the stresses which the implement will cause to the beams when in use doing work (e.g. lifting).

[0051] As per FIG. 2, the second embodiment of the implement adapter further includes the first hollow cross beam (12), the first hollow cross beam being structurally similar to the first hollow beam (2) and the second hollow beam (3) and being generally box-like in construction with a top wall, bottom wall, inner wall and outer wall, as in the first embodiment. The first hollow cross beam also has the first end (15), the spaced apart, opposite, second end (16) and first hollow beam length (45). The first hollow cross beam first end (15) is firmly connected to the second hollow beam (3) inner wall, proximate to the second hollow beam first end and the first hollow cross beam second end (16) is firmly connected to the first hollow beam (2) inner wall, proximate to the first hollow beam first end. Just as in the first embodiment, the first hollow cross beam is essentially perpendicular relative to the first hollow beam and the second hollow beam and horizontally coplanar with both the first hollow beam and the second hollow beam and spans between the first and second hollow beams. In effect, the first hollow beam,

second hollow beam and first hollow cross beam once firmly connected as noted above, take the form of an essentially squared off "U".

[0052] As per FIG. 2, the second embodiment of the implement adapter further includes a second hollow cross beam (17). However, unlike the form of the second hollow cross beam in the preferred embodiment, in the second embodiment, the second hollow cross beam is identical to the first hollow cross beam, being structurally similar to the first hollow beam (2) and the second hollow beam (3) and being generally box-like in construction with a top wall, bottom wall, inner wall and outer wall, and of course having the first end (18) and the opposite and spaced apart second end (19). The second hollow cross beam has length (20) preferably equal to the first cross beam length. The second hollow cross beam is firmly attached at its second end to the first hollow beam second end, and the second hollow beam first end is attached to the second hollow cross beam second end. The second hollow cross beam is parallel to the first hollow cross beam, perpendicular to the first and second hollow beams, and horizontally coplanar with the first hollow beam, second hollow beam and first cross beam.

[0053] The main body portion of the second embodiment of the implement adapter now described, it is useful to describe the primary difference between the first embodiment and the second embodiment, namely, the arm attachment means, as per FIGs. 1, 10 and 11. In the first embodiment, the instant invention includes the necessary attachment points for example, to attach a hook (80) and pin for attaching to a swivleable or pivotable attachment such as the Wain Roy tilting attachment mentioned above. Naturally, the hook (80) is a component of the

swivleable attachment, and the entire structure of a pivotable/swivleable attachment such as the Wain Roy tilting attachment is not detailed. Again, as has been stressed throughout this disclosure, the precise mechanism used by each bucket manufacturer, arm manufacturer and or tilting attachment manufacturer will largely dictate the corresponding attachment points of the instant invention. In the second embodiment, the chief difference is the presence of holes used to attach the instant invention directly to the arm of, for example, a Model 490-D excavator manufactured by John Deere. This particular configuration is set forth again, merely as an example, and the particular attachment requirements of the heavy machine to which the instant invention is to be attached dictates the actual configuration.

[0054] As noted above, the heavy machine for which this particular arm attachment means is configured is the Model 490-D excavator, manufactured by the John Deere Corporation. It will be clear to those familiar with the art that the principal differences in the arm attachment means between the preferred and second embodiment are the shape of the second hollow cross member, and the replacement of a single carrier bearing with two pair of opposed cylinders or sleeves.

[0055] As per FIG. 2, the arm attachment means of the second embodiment includes a second embodiment mounting plate (51), the second embodiment mounting plate having a first end (52) and an opposite second end (53), and preferably has sufficient length to span the distance from the first hollow beam outer side to the second hollow beam outer side. The mounting plate (51) is

attached at its first end to the first hollow beam top wall and at its second end to the second hollow beam top wall. The mounting plate has mounting plate thickness (54), which in the preferred embodiment is $\frac{3}{4}$ of one inch. However, this thickness is once again dependent upon the material from which the plate is to be manufactured and the stress the plate will be subjected to when in use, and may be varied accordingly. As was noted, the mounting plate (51) should be long enough to span the first and second hollow beams, and furthermore, the plate is oriented such that its length is parallel to the second cross beam length. The mounting plate, however, is obviously located in a different horizontal plane than the second cross beam (e.g., above it) given its stated attachment to the top wall of the first hollow beam as opposed to the stated attachment of the second hollow cross beam to the inner wall of the first hollow beam.

[0056] As per FIGs. 2, and 5, the arm attachment means includes a first upright arm attachment plate (55) and an opposite second upright arm attachment plate (56), each being firmly attached to the mounting plate (51). The first upright arm attachment plate and the second upright arm attachment plate are parallel to the second hollow beam length (8), extending in a direction from the second hollow cross beam (17) towards the first hollow cross beam (12). As per FIG. 5, the first upright arm attachment plate (55) and the second upright arm attachment plate (56) are mirror images of one another. Therefore, only the first upright arm attachment plate will be described in any detail.

[0057] As per FIG. 5, the first upright arm attachment plate (55) has length (57), height (58) and thickness (59). In the second embodiment, the first upright arm

attachment plate thickness (59) is approximately 0.88 inch. The length (57), as noted above, is parallel to, though not coplanar with, the second hollow beam length (8). The height (58) is parallel to the, though not coplanar with, the second hollow beam height (10). In form, one can view the first and second upright arm attachment plates as being essentially like a pair of blades extending upwardly and away from the arm attachment plate, and being parallel to one another.

[0058] The first upright arm attachment plate further has a first end (60), an opposite and spaced apart second end (61), at top (62), a bottom (63), a first side (64) and an opposite and spaced apart (by thickness) second side (65). The first upright arm attachment plate is attached along its bottom to the mounting plate (51). In form, the first upright arm attachment plate of the second embodiment is similar to a rectangle which has been radiused (given a curving contour) three times. The first end (60) is radiused, the second end (61) is radiused in the opposite direction and the top is radiused downwardly, towards the mounting plate. Given that the mounting plate (51) is flat, it should be obvious that in order to increase the strength of the attachment of the first upright arm attachment plate to the mounting plate, the bottom (63) of the first upright arm attachment plate should also be flat.

[0059] The first upright arm attachment plate further has a first hole having a bore (66) passing completely through the first side (64) and the second side (65), and a second hole having a bore (67) also passing completely through the first side (64) and the second side (65). The first hole having a bore (66) and the second hole having a bore (67) each have a diameter (69), which in the second embodiment is

approximately 2.75 inches. Obviously, given that each has a diameter, each further has a radius, and the center point of the radius of each are spaced apart from one another at a distance (68) which in the second embodiment is approximately 14.50 inches. This particular form plays no particular function other than to permit attachment of the arm without binding on any portion of the terminating end of the arm, and will therefore obviously be varied according to the attachment requirements of various heavy machines and manufacturers. Furthermore, the precise location of the first hole having a bore (66) and the second hole having a bore (67) on the first upright arm attachment plate (55) and the second upright arm attachment plate (56) is determined by the requirements of the arm, and can therefore vary from manufacturer to manufacturer. So long as the first hole having a bore (66) and second hole having a bore (67) will allow attachment of the implement adapter to the arm, the device will function as intended.

[0060] The second embodiment of instant invention, as per FIGs. 5, 6 and 7, further includes four arm mount sleeves (70). As each arm mount sleeve is identical, only one will be described in detail. The arm mount sleeve (70) is nearly "T" shaped, when viewed elevationally, and may be thought of as a pair of joined hollow cylinders comprising a first end (76) with a wider portion (71) and a second end (77) with a narrower portion (72). The narrower portion has an outer diameter (73) slightly less than the second hole bore diameter (69) such that the arm mount sleeve narrow portion (72) may be pressed through the first upright arm attachment plate first side (64) and extend out of the first upright arm attachment plate second side. The arm mount sleeve (70), is pressed, coaxially

within second bore of the second hole (67) so it is held there firmly. This is repeated for each of the holes passing through the first upright arm attachment plate and the second upright arm attachment plate.

[0061] While the arm mount sleeve may be thought of as a pair of joined hollow cylinders, it is believed more efficient to fabricate it as a single piece. A hole having a bore (79) passes axially through the arm mount sleeve, from the first end (76) to the second end (77) so that a pin or rod may be rotatably mounted therein. The hole having a bore (79) obviously has a diameter (78), the diameter in the second embodiment being preferably 2.75 inches. It has also been useful, when the second embodiment of the instant invention is being attached to the arm of the John Deere 490-D excavator to include a beveled edge (75) on the second end (77) so that a rubber seal may be placed on the bevel and used as an oil seal (to maintain lubrication), though this is clearly not a requirement in order for the invention to function as intended.

[0062] It can not be stressed enough that the various measurements, and precise configurations of the arm attachment means in the second embodiment, as in the preferred one, are to be considered merely as exemplars, and not as the only ways to accomplish the objects of the invention. Each piece of heavy machinery utilizing a arm may have slightly different requirements as to size or precise form for the arm attachment means. This will be immediately recognized by those skilled in the art, and when considering the particular requirements of a particular heavy machine will now be relatively simple to construct given the disclosure by the inventor of both the concept and the pair of particularly disclosed examples of the

invention.

[0063]

Therefore, attachment of the second embodiment of the implement adapter to the machine referenced above may now be fully understood. The implement adapter is removably attached to the particular heavy machine (e.g. excavator) with which it is to be used. As with the first embodiment, the most distal end of the arm, which is normally attached to a bucket, but for purposes of use with the instant invention has been detached from said bucket, is brought into contact with the implement adapter such that the bucket attachment portion of the arm (or so-called "dipper stick") may be aligned with the first upright arm attachment plate (55) and the second upright arm attachment plate (56). The bucket having been removed from the arm, there will now be a total of four arm holes in the arm which are brought into alignment with the two holes of the upright arm attachment plates. While being referred to generally as "four holes in the arm", the precise number of holes, and whether they are in the arm, in an associated biasing mechanism (such as, for example, a hydraulic cylinder), or any combination thereof will vary from manufacturer to manufacturer and from heavy machine to heavy machine. At least two rod-like pins each having exterior diameter somewhat less than the arm mount sleeve hole bore diameter (79) are each inserted into the arm holes so that they extend through the arm and the arm mount sleeves. Each pin is then secured, generally with a threaded bolt and nut or cotter pin or similar means. Obviously, the number of the rod-like pins (whether two or more) is a function of the requirements of the particular arm, as specified by each particular manufacturer.

[0064]

The securing of the pins, and in fact the pins themselves, takes no additional knowledge or invention as part of the creative genius of the instant invention is to utilize the pre-existing structure of the arm and bucket attachment, and create an implement attachment device which may be attached to the arm without requiring modification to the arm, and utilizing the same components as one would use to attach the bucket to the arm. Again, the precise means and process used for attaching the instant invention to the arm, will be no different than the precise means and process used for attaching the bucket to the arm. If the bucket requires two pins, one passing through the arm and one through, for example, a biasing means such as a hydraulic cylinder, then the second embodiment of the instant invention would be configured in the same manner, and attach to the arm in the same manner.